

## 504 Reinforcing Steel Quality Management Plan

### 504.1 Introduction

The purpose of the Reinforcing Steel Quality Management Plan (QMP) is to establish the procedures for becoming pre-qualified as a supplier of reinforcing steel bar and mesh. The Management Plan is to assure the Utah Department of Transportation that reinforcing steel manufacturers are capable of producing quality materials. Only materials produced by a pre-qualified supplier in an approved status will be accepted and certified for UDOT use.

### 504.2 Pre-qualifications for Reinforcing Steel Manufacturers

504.2.1 Applicants shall submit to the Quality Assurance (QA) Engineer, a letter requesting that it be designated as a pre-qualified supplier. The letter will include the following:

504.2.1.1 Name and phone number of the Quality Control Director at each production location who may be contacted for data, shipping information, and to whom reports of UDOT's comparison tests will be directed.

504.2.2 The manufacturer shall contact the QA Engineer to arrange for the required sampling and testing as outlined in section 4.3 of this QMP. The manufacturer will make all necessary plant test records and manuals available to the QA Engineer or representative, when requested. The QA Engineer may choose to forgo the pre-qualification sampling and testing based upon qualification tests performed by transportation agencies of other states.

504.2.3 The Reinforcing Steel Manufacturer agrees to:

504.2.3.1 Meet or exceed UDOT's Standard Specifications, and follow all quality control requirements outlined in the applicable ASTM and AASHTO specifications.

504.2.3.2 Include certified mill test reports representing each heat number with each shipment. Each bundle of reinforcing steel is to be tagged with a plastic or metal tag which lists the plant name and the heat, job or mill order number. They must attach the tag to each bundle with a plastic or metal strip seal.

504.2.3.3 Have a written company quality control (QC) policy statement and a QC manual. A copy of the QC policy statement and manual shall be sent to UDOT's QA Engineer. Have a designated Quality Inspector present on every work shift having authority to fully enforce the QC procedures. Provide adequate training to familiarize all pertinent employees with the company's QC procedures. The QC manual must be approved by UDOT's QA Engineer prior to acceptance as a pre-qualified manufacturer. Periodically review and update the QC manual as necessary. Any revisions shall be sent to UDOT's QA engineer.

504.2.4 The QC manual must include the following

504.2.4.1 Management responsibilities. The responsibility, authority and the interrelation of all personnel who manage, perform and verify work affecting quality shall be defined - particularly for personnel who need the organizational freedom and authority to initiate action to prevent the occurrence of product nonconformity as well as those who identify and record any product quality problems, or those who initiate, recommend or provide solutions through designated channels and control further processing of nonconforming materials.

504.2.4.2 Quality Control Requirements. Shall identify in-house quality control requirements, as well as provide adequate resources and assign trained personnel for quality control activities. Quality control requirements shall include inspection, testing and monitoring of the product to ensure the requirements of UDOT specifications are met.

504.2.5 Notification of acceptance as a Pre-Qualified Reinforcing Steel Fabricator will be made in writing by the QA Engineer.

### 504.3 Sampling and Testing Requirements

- 504.3.1 **Sampling Procedure.** The lot of material subject to sampling can include all sizes, grades and heats in stock, as requested by the QA Engineer or representative. Samples will be taken from three different bars from each of 10 different heats, unless otherwise authorized by the UDOT QA Engineer or representative. Sample lengths for all bars will be at least 11.5 feet. Each *sample* bar will be tagged on both ends with the same identification number. Each identification number will be unique. Two *specimens* will be made by cutting the bar into two equal lengths.
- 504.3.2 **Sample Testing.** Test methods will be in accordance with AASHTO, ASTM and UDOT Standard specifications. One specimen from each sample will be tested by the manufacturers's laboratory utilizing test equipment which will be maintained in good working order and will have been calibrated within the preceding 12 month period by a qualified testing agency. The manufacturer's test results will be entered on a form provided by the QA Engineer. The form will be signed by a representative of the manufacturer and submitted to the Utah Department of Transportation's Quality Assurance (UDOT's QA) Section. The remaining specimen from each sample will contain the markings normally used by the producer and will be sent to the UDOT's QA Section to test for compliance with section 504.3.3 of this document. All shipping costs to send the test specimens to UDOT's QA Section will be borne by the manufacturer.
- 504.3.3 **Testing Requirements.** The manufacturer is required to meet the following requirements in order to obtain an approved plant status. Statistical analysis will be made to compare results obtained by the manufacturer with results of UDOT's QA section. The comparisons will include both F-test and t-test methods, which will compare variances and the difference in means of the results, respectively. Both tests will be conducted at a level of significance of alpha equal to 0.01. This is to minimize the likelihood of incorrectly concluding that the test results are different when they are not. The comparisons will be for each of the following: yield strength, tensile strength and percent elongation. If,  $F \geq F_{crit}$ , then the conclusion will be that the manufactures and UDOT's QA results vary significantly. If  $t \geq t_{crit}$ , then the conclusion is that the means are significantly different. When test result comparisons show the variance in  $t \geq t_{crit}$  the manufacturer will not qualify as a pre-qualified source. Results that show the variance in  $F \geq F_{crit}$ , will be evaluated on a case by case basis to determine a manufacturers pre-qualification status. The manufacture may investigate and if it is determined that their testing was in error, a letter shall be sent to the QA engineer indicating what corrective action has been made. Upon review and approval of the QA Engineer, more samples may be obtained as prescribed in section 504.3.1 and re-evaluated as per section 504.3.2.
- 504.3.4 **Maintenance of Pre-Qualification Status.** A pre-qualified manufacturers status will be in effect for a 12-month period unless the manufacturer is removed from pre-qualified status under conditions of this QMP. A dis-qualified manufacturer that has been removed from an approved status may regain pre-qualification status at the next annual renewal inspection, provided requirements for pre-qualification are met. A manufacturer that has been removed from pre-qualified status, may request a re-test for pre-qualification status prior to the annual renewal inspection provided it can be demonstrated to the QA Engineer that the causes of the deficiencies have been remedied. A manufacturer will be notified in writing of any change in plant status. A list of pre-qualified manufacturers will be maintained by the UDOT QA Section.
- 504.3.5 A Manufacturer will be removed from the qualified source list and be required to re-apply as a qualified source, if not supplying to a UDOT controlled project within a 12 month period.